Research Journal of Microbiology

ISSN 1816-4935

Academic
Journals Inc.

www.academicjournals.com

Research Journal of Microbiology 10 (9): 447-451, 2015
ISSN 1816-4935 / DOI: 10.3923/jm.2015.447.451

Asymptomatic Bacteriuria and Pyuria in Patients with Chronic Renal Failure Undergoing Hemodialysis at Dialysis Centers in Kermanshah, Iran

[1]Mehrdad Payandeh, [2]Dariush Raeisi, [3]Ali Shahriari-Ahmadi, [4]Edris Sadeghi, [4]Masoud Sadeghi and [1]Mehrnoush Aeinfar

[1]Department of Hematology and Medical Oncology, Kermanshah University of Medical Sciences, Kermanshah, Iran
[2]Department of Kidney Transplantation, Kermanshah University of Medical Sciences, Kermanshah, Iran
[3]Rasoul-e-Akram Hospital, Hematology and Medical Oncology Ward, Iran University of Medical Sciences, Tehran, Iran
[4]Medical Biology Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran

Corresponding Author: Edris Sadeghi, Medical Biology Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran

ABSTRACT

Pyuria is the presence of increased numbers of polymorphonuclear leukocytes in the urine and is evidence of an inflammatory response in the Urinary Tract Infection (UTI). The aim of this study is determination asymptomatic bacteriuria and pyuria in patients undergoing hemodialysis with chronic renal failure. Out of 103 patients with renal failure undergoing hemodialysis who were able to produce urine with clean catch way, we received urine sample. All samples were examined by the Microbiologist in Central Laboratory of Kermanshah, Iran. The mean age for the patients at diagnosis was 42.4 years (range, 20-67 years). Sixty-four patients (62.5%) were male and thirty-nine (37.5%) were female. Results have been showed 39 cases were aged between 44-49 years and the highest number cases were middle-aged. Out of 31 patients with leukocytosis, 14 patients had age between 44-49 years and majority of them were male. Pyuria(>10 WBC/HPF or <10 WBC/HPF) was more in male that had between 40-49 years. Patients (10/12) with pyuria (>10 WBC/HPF) developed colony count more than 10^5 colony-forming units per milliliter that indicating positive culture. Microorganisms didn't grow in patients (10/19) with pyuria (<10 WBC/HPF). This study demonstrates that the UTI, even in end stage renal disease (ESRD) patients on hemodialysis, may represent a significant reservoir for infection and pyuria >10 WBC/HPF is a good marker for significant bacteriuria in these patients.

Key words: Bacteriuria, Escherichia coli, hemodialysis, pyuria, UTI

INTRODUCTION

Asymptomatic bacteriuria, or asymptomatic urinary infection, is isolation of a specified quantitative count of bacteria in an appropriately collected urine specimen obtained from person without symptoms or signs referable to urinary infection (Rubin *et al*., 1992). Pyuria is the presence of increased numbers of polymorphonuclear leukocytes in the urine and is evidence of an inflammatory response in the urinary tract (Stamm, 1983). Patients with renal failure on

maintenance hemodialysis have an increased incidence of infections due to defects in cellular immunity, neutrophil function and neutrophil response to infection (Lazarus and Hakim, 1991). Asymptomatic bacteriuria is a microbiologic diagnosis determined with a urine specimen that has been collected in a manner to minimize contamination and transported to the laboratory in a timely fashion to limit bacterial growth. The usual quantitative definition is 10^5 cfu mL^{-1} (colony-forming units per milliliter) in 2 consecutive urine specimens (Nicolle *et al*., 2005). Asymptomatic bacteriuria is a common complication after renal transplantation and the need for antibiotic therapy is controversial. If Urinary Tract Infection (UTI) occurred in this population it has proved harmful effect on allograft function and survival, in addition to infectious complications and bacteremia (Muller *et al*., 1998). Less than 10^5 cfu mL^{-1} usually meant persistently low levels of bacteriuria, with distinctive microflora for each group (Kass, 1960; Norden and Kass, 1968). To diagnose a patient with bacteriuria, whether it was symptomatic or asymptomatic, the presence of pyuria ($\geq$10 leukocytes mm^{-3} of uncentrifuged urine) is not sufficient (Hooton *et al*., 2000). But pyuria is evidence of inflammation in the genitourinary tract and is common in subjects with asymptomatic bacteriuria (Nicolle, 1997). The aim of this study is determination asymptomatic bacteriuria and pyuria in patients undergoing hemodialysis with chronic renal failure.

MATERIALS AND METHODS

Of 103 patients with renal failure undergoing hemodialysis who were able to produce urine with clean catch way, we received urine sample. It should be noted, hemodialysis patients who had evidence of urinary tract infection and a history of recent drug or illnesses that cause urinary stasis in the kidney were excluded from the our research. Two days after the last session of hemodialysis, urine volume (12 mL) was prepared per the patient. All samples were examined by the microbiologist in coordination by the Central Laboratory of Kermanshah, Iran. At the time sampling, 0.001 mL centrifuged urine volume in blood agar were cultured for 24 h. One milliliter of centrifuged urine for microscopic analysis was used by laboratory personnel. The collected data in this study were included test in the laboratory, interview and observation and also data gathering tool was questionnaire and an information form.

RESULTS

The mean age for the patients at diagnosis was 42.4 years (range, 20-67 years). Sixty-four patients (62.5%) were male and thirty-nine (37.5%) were female. Results given in Table 1 that 39 cases were aged between 44 to 49 years and the highest number cases were middle-aged. Of

Table 1: Distribution of patients by age and sex and presence or absence of leukocytosis

	Positive						Negative						Total			
	Male		Female		Total		Male		Female		Total		Male		Female	
Age	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
20-25	1	5.5	-	-	1	3.3	3	6.5	1	3.9	4	5.6	4	6.2	1	2.6
26-31	-	-	1	7.7	1	3.3	3	6.5	1	3.9	4	5.6	3	4.6	2	5.2
32-37	2	11.2	1	7.7	3	9.7	6	13.0	4	15.3	10	13.8	8	12.5	5	12.8
38-43	2	11.2	2	15.4	4	12.9	13	28.3	7	26.9	20	27.7	15	23.5	9	23.1
44-49	8	44.4	6	46.2	14	45.1	17	36.9	8	30.7	25	34.7	25	39.1	14	35.8
50-55	4	22.2	2	15.3	6	19.3	2	4.4	3	11.5	5	7.0	6	9.4	5	12.8
56-61	1	5.5	1	7.7	2	6.4	1	2.2	2	7.8	3	4.1	2	3.1	3	7.7
62-67	-	-	-	-	-	-	1	2.2	-	-	1	1.4	1	1.6	-	-
Total	18	100.0	13	100.0	31	100.0	46	100.0	26	100.0	72	100.0	64	100.0	39	100.0

Table 2: Distribution of patients by age and sex and pyuria (>10 WBC/HPF and <10 WBC/HPF)

	More than 10 WBC/HPF				Less than 10 WBC/HPF			
	Male		Female		Male		Female	
Age	No.	%	No.	%	No.	%	No.	%
20-25	-	-	-	-	1	9.09	-	-
26-31	-	-	-	-	-	-	1	12.5
32-37	1	14.2	1	20	1	9.09	-	-
38-43	1	14.2	1	20	1	9.09	1	12.5
44-49	3	42.8	2	40	5	45.40	4	50.0
50-55	2	28.5	1	20	2	18.18	1	12.5
56-61	-	-	-	-	1	9.09	1	12.5
62-67	-	-	-	-	-	-	-	-
Total	7	100.0	5	100	11	100.00	8	100.0

Table 3: Distribution of patients by age and culture with pyuria (>10 WBC/HPF)

Age	*E. coli*	Mixed germ	Staphylococcus	*S. aureus*	*Enterococcus*	*Klebsiella pneumiae*	No growth	Strept group	Strept group	No grout <3 microorganisms	Total
20-25	-	-	-	-	-	-	-	-	-	-	-
26-31	-	-	-	-	-	-	-	-	-	-	-
32-37	1	-	-	-	-	1	-	-	-	-	2
38-43	1	-	1	-	-	-	-	-	-	-	2
44-49	3	-	1	-	-	-	-	-	1	-	5
50-55	-	2	-	-	1	-	-	-	-	-	3
56-61	-	-	-	-	-	-	-	-	-	-	-
62-67	-	-	-	-	-	-	-	-	-	-	-
Total	5	2	2	-	1	1	-	-	1	-	12

Table 4: Distribution of patients by age and culture with pyuria (<10 WBC/HPF)

Age	*E. coli*	Mixed germ	Staphylococcus	*S. aureus*	Enterococcus	*Klebsiella pneumiae*	No growth	Strept group	Strept group	No grout <3 microorganisms	Total
20-25	1	-	-	-	-	-	-	-	-	-	1
26-31	-	-	-	-	-	-	-	-	-	1	1
32-37	-	-	-	-	-	-	1	-	-	-	1
38-43	-	-	-	-	-	-	1	-	-	1	2
44-49	1	-	1	-	-	1	5	-	1	-	9
50-55	-	-	1	-	-	-	1	-	-	1	3
56-61	-	-	-	-	-	-	2	-	-	-	2
62-67	-	-	-	-	-	-	-	-	-	-	-
Total	2	-	2	-	-	1	10	-	1	3	19

31 patients with leukocytosis, 14 patients had age between 44 to 49 years and majority of them were male. Pyuria (>10 WBC/HPF or <10 WBC/HPF) was more in male that had between 40 to 49 years (Table 2). Patients (10/12) with pyuria (>10 WBC/HPF) developed colony count more than 10^5 cfu mL^{-1} that indicating positive culture (Table 3). Microorganisms didn't grow in patients (10/19) with pyuria (<10 WBC/HPF) (Table 4).

DISCUSSION

Pyuria (>10 WBC/HPF) is an important test that can differentiate UTI from colonization or contamination of the urine (Stamm *et al*., 1982) and most authors support pyuria (<10 WBC/HPF) as being indicative of presence of low risk of bacterial infections (Chiu *et al*., 1997). Pyuria can be a criterion for urinary infection. Asymptomatic bacteriuria is rare among healthy young men (Lipsky, 1989), but prevalence increases with advancing age to reach about six percent at 60 years of age and to 15% of men over 75 years of age (Nicolle, 1997). The prevalence of asymptomatic bacteriuria among healthy women increases with advancing age, from about one percent among schoolgirls to >20% among women over 80 years residing in the community (Bengtsson *et al*.,1998).

UTI is more common in men asymptomatic patients undergoing hemodialysis. Patients undergoing hemodialysis have a prevalence of asymptomatic bacteriuria of 28% (Chaudhry *et al*., 1993) in our study was 30%. Twenty five percent to 50% of elderly women and 15-40% of elderly men in long-term care facilities are bacteriuric (Nicolle, 1997). A high incidence of pyuria has been reported in patients on hemodialysis, but has not been correlated with bacteriuria(Cabaluna *et al*., 1977), but asymptomatic bacteriuria is associated with an increased risk of symptomatic urinary tract infection is in agreement with findings of other investigators (Kunin, 1970; Gaymans *et al*., 1976) this association with pyuria in many cases will eventually develop into symptomatic true UTI (Hooton *et al*., 2000; Asscher *et al*., 1969; Chaudhry *et al*., 1993) like our study. Some authors agree with the fact that the sensitivity, specificity and positive predictive value of the urine analysis is low and only a third to half of patients with positive urine culture results can be identified correctly (Lin *et al*., 2000). Of the 103 patients with renal failure on hemodialysis, 31 patients had leukocytosis that 12 of them are located in pyuria (>10 WBC/HPF) group and 19 of them in pyuria (<10 WBC/HPF). Of 12 patients in pyuria (>10 WBC/HPF) 10 (83.3%) patients had positive urine culture result. Microorganisms responsible for contamination are usually commensals from the distal urethra or periurethral areas, including Lactobacilli, Staphylococci (coagulase-negative), Corynebacteria and Streptococci (Marrie *et al*., 1978). Other Enterobacteriaceae (such as *Klebsiella pneumoniae*) and other organisms (including coagulase-negative staphylococci, *Enterococcus* sp., group B streptococci and *Gardnerella vaginalis*) are common as well. For men, coagulase-negative staphylococci are also common, in addition to gram-negative bacilli and *Enterococcus* sp. (Lipsky *et al*., 1984; Mims *et al*., 1990). Microorganisms responsible in this study were *Escherichia coli*, Mixed gram, Staphylococci, *Enterococcus* sp. and Klebsiella pneumonia. Up to 90% of UTIs in normal outpatients are due to *Escherichia coli* (Rubin *et al*., 1991). *E. coli* remains the single most common organism isolated from women, but other organisms, such as *Proteus* mirabilis, are more common in men (Nicolle, 1997). Also, many organisms that cause asymptomatic bacteriuria may be less virulent (Roos *et al*., 2006).

CONCLUSION

This study demonstrates that the UTI, Even in End Stage Renal Disease (ESRD) patients on hemodialysis, may represent a significant reservoir for infection and pyuria >10 WBC/HPF is a good marker for significant bacteriuria in these patients (especially in the age 44-49 years group).

REFERENCES

Asscher, A.W., M. Sussman, W.E. Waters, J.A. Evans, H. Campbell, K.T. Evans and J.E. Williams, 1969. The clinical significance of asymptomatic bacteriuria in the nonpregnant woman. J. Infect. Dis., 120: 17-26.

Bengtsson, C., U. Bengtsson, C. Bjorkelund, K. Lincoln and J.A. Sigurdsson, 1998. Bacteriuria in a population sample of women: 24-year follow-up study: Results from the prospective population-based study of women in Gothenburg, Sweden. Scand. J. Urol. Nephrol., 32: 284-289.

Cabaluna, C.C., N.E. Gary and R.P. Eisinger, 1977. Urinalysis in patients on chronic hemodialysis. Urology, 10: 103-104.

Chaudhry, A., W.J. Stone and J.A. Breyer, 1993. Occurrence of pyuria and bacteriuria in asymptomatic hemodialysis patients. Am. J. Kidney Dis., 21: 180-183.

Chiu, C.H., T.Y. Lin and M.J. Bullard, 1997. Identification of febrile neonates unlikely to have bacterial infections. Pediatr. Infect. Dis. J., 16: 59-63.

Gaymans, R., M.I. Haverkorn, H.A. Valkenburg and W.R.O. Goslings, 1976. A prospective study of urinary-tract infections in a Dutch general practice. Lancet, 308: 674-677.

Hooton, T.M., D. Scholes, A.E. Stapleton, P.L. Roberts and C. Winter *et al*., 2000. A prospective study of asymptomatic bacteriuria in sexually active young women. N. Engl. J. Med., 343: 992-997.

Kass, E.H., 1960. The Role of Asymptomatic Bacteriuria in the Pathogenesis of Pyelonephritis. In: Biology of Pyelonephritis, Quinn, E.L. and E.H. Kass (Eds). Little, Brown, Boston, pp: 399-412.

Kunin, C.M., 1970. The natural history of recurrent bacteriuria in schoolgirls. New Engl. J. Med., 282: 1443-1448.

Lazarus, J.M. and R.M. Hakim, 1991. Medical Aspects of Hemodialysis. In: The Kidney, Brenner, B.M. and F.C. Rector (Eds.). Saunders, Philadelphia, PA., pp: 2223-2298.

Lin, D.S., S.H. Huang, C.C. Lin, Y.C. Tung and T.T. Huang *et al*., 2000. Urinary tract infection in febrile infants younger than eight weeks of age. Pediatrics, Vol. 105. 10.1542/peds.105.2.e20

Lipsky, B., 1989. Urinary tract infections in men: Epidemiology, pathophysiology, diagnosis and treatment. Ann Internal Med., 110: 138-150.

Lipsky, B.A., T.S. Inui, J.J. Plorde and R.E. Berger, 1984. Is the clean-catch midstream void procedure necessary for obtaining urine culture specimens from men? Am. J. Med., 76: 257-262.

Marrie, T.J., G.K. Harding and A.R. Ronald, 1978. Anaerobic and aerobic urethral flora in healthy females. J. Clin. Microbiol., 8: 67-72.

Mims, A.D., D.C. Norman, R.H. Yamamura and T.T. Yoshikawa, 1990. Clinically inapparent (asymptomatic) bacteriuria in ambulatory elderly men: Epidemiological, clinical and microbiological findings. J. Am. Geriatrics Soc., 38: 1209-1214.

Muller, V., G. Becker, M. Delfs, K.H. Albrecht, T. Philipp and U. Heemann, 1998. Do urinary tract infections trigger chronic kidney transplant rejection in man? J. Urol., 159: 1826-1829.

Nicolle, L.E., 1997. Asymptomatic bacteriuria in the elderly. Infect. Dis. Clin. North Am., 11: 647-662.

Nicolle, L.E., S. Bradley, R. Colgan, J.C. Rice, A. Schaeffer and T.M. Hooton, 2005. Infectious Diseases Society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. Clin. Infect. Dis., 40: 643-654.

Norden, C.W. and E.H. Kass, 1968. Bacteriuria of pregnancy-a critical appraisal. Annu. Rev. Med., 19: 431-470.

Roos, V., M.A. Schembri, G.C. Ulett and P. Klemm, 2006. Asymptomatic bacteriuria *Escherichia coli* strain 83972 carries mutations in the foc locus and is unable to express F1C fimbriae. Microbiology, 152: 1799-1806.

Rubin, R.H., N.E. Tolkoff-Rubin and R.S. Cotran, 1991. Urinary Tract Infection, Pyelonephritis and Reflux Nephropathy. In: The Kidney, Brenner, B.M. and F.C. Rector (Eds.). Saunders, Philadelphia, PA., pp: 1369-1429.

Rubin, R.H., E.D. Shapiro, V.T. Andriole, R.J. Davis and W.E. Stamm, 1992. Evaluation of new anti-infective drugs for the treatment of urinary tract infection. Clin. Infect. Dis., 15: S216-S227.

Stamm, W.E., G.W. Counts, K.R. Running, S. Fihn, M. Turck and K.K. Holmes, 1982. Diagnosis of coliform infection in acutely dysuric women. New Engl. J. Med., 307: 463-468.

Stamm, W.E., 1983. Measurement of pyuria and its relation to bacteriuria. Am. J. Med., 75: 53-58.